

Japanese Patent Application Laid-Open (JP-A) No. 11-232026

Laid-Open Date: August 27, 1999

Application No. 10-32842

Application Date: February 16, 1998

Applicant: Canon Inc.

Title: Image Processor



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[SUMMARY]

[OBJECT]

To improve operability of image search in a portable terminal having a small display screen.

[MEANS FOR SOLUTION]

An image display 206 is disposed on a front surface, and a pointing device 208 in which a cursor is moved by touching the device with a finger is laid out and displayed on a rear surface which is opposite the front surface. The pointing device 20 is formed so as to be circular, and a rib 209 is formed on the circumference thereof and its concentric circle. With this structure, a user can move the cursor on the image display 206 and select an image by mere rotary operation without looking at the operating device itself.

## [DETAILED DESCRIPTION OF THE INVENTION]

[0001]

[Technical Field of the Invention]

The present invention relates to an image processor which can reproduce images.

[0002]

[Prior Art]

In conventional image processors, when a desired image is selected from among images stored therein, reduced-size images such as thumbnail images are listed on a display in columns and rows, and a desired reduced-size image is selected from among the listed images by operating cursor movement keys for moving a cursor up, down, right and left or by directly touching a soft key on a display screen.

[0003]

[Problems to be Solved by the Invention]

However, the conventional technique has a drawback in that, in a method in which a finger directly touches the display screen, the finger may hide the display or stain the surface of the display.

[0004]

Further, the conventional image processor needs to have cursor movement keys or scroll keys, and a page break key. Thus, when the conventional image processor is made small such as a

portable terminal, the conventional image processor has a drawback in that the display screen also becomes small, whereby operability deteriorates.

[0005]

A method using a technique such as a touch panel or the like for directly designating an object on the display may be a solution to the above problems. However, this method has a drawback in that the display of the image processor such as the portable terminal may be obstructed, whereby operability deteriorates.

[0006]

[Means for Solving the Problems]

In order to solve the above problems, the present invention provides an image processor including display means for displaying images and designation means for selecting an image from among the images displayed on the display means, the designation means being provided on a surface opposite the surface on which the display means is provided. Preferably, the designation means is circular and includes a rib formed on the circumference and a concentric circle thereof to guide finger movements. Further, it is preferable that a home position is provided at the designation means and a protrusion is provided at the home position. Furthermore, it is preferable that the images are reduced in size, and the image processor of the present invention includes control means for controlling such that the

reduced-size images are laid out and displayed so as to surround the circumference of the display means. Moreover, the designation means preferably permits an input in accordance with a designation of the home position. Further, the image processor is preferably portable.

[0007]

[Embodiments]

Fig. 1 is a block diagram showing the components of an image processor of the present invention.

[0008]

Before an explanation of the respective components, operation of the entire image processor will be described.

[0009]

Image information stored in built-in RAM 5 is displayed on an image display 2, and a desired image is selected by operating a touch-sensitive pointing device 7 laid out on a rear surface which is opposite the surface on which the image display 2 is provided. The image processor also has a function of sending the reproduced image together with a voice memo attached thereto via a microphone 8.

[0010]

Reference numeral 1 indicates a CPU, which is a control section for controlling the image processor in accordance with a

flowchart which will be described later. Reference numeral 2 indicates an image display. Reference numerals 3 and 4 indicate a PHS module and an IrDA module, respectively, which send or receive image data such as a still image or a dynamic image stored on a hard disk of a remote server, DVD-RAM or the like, and voice data accompanied with the image data. Reference numeral 5 indicates RAM, which is a memory section for storing the image data received by the PHS module 3 or the IrDA module 4. The RAM 5 is also used as a work buffer. Reference numeral 6 indicates ROM, which is nonvolatile memory which stores the flowchart and the like to be described later. The memory indicated by reference numeral 6 is not limited to the ROM but may be any memory such as EEPROM or the like, as long as it is nonvolatile. Reference numeral 7 indicates a touch-sensitive pointing device. Reference numerals 8, 9 and 10 indicate a microphone, a speaker and a headphone, respectively. Reference numeral 11 indicates a battery. Reference numeral 12 indicates a bus.

[0011]

Next, the overall structure of the image processor according to an embodiment of the present invention will be described with reference to Fig. 2.

[0012]

The image processor to be described is a portable terminal having the size of a card.

[0013]

However, the size of the portable terminal described in the present embodiment is not limited to that of a card, but the portable terminal may be of any size as long as it is small.

[0014]

Reference numerals 201, 202, 203 and 204 indicate the image processor in developed views, namely, a top view, a front view, a right side view, and a rear view of the image processor, respectively.

[0015]

A user moves a cursor by moving his/her finger on the touch-sensitive pointing device 208 on the rear surface while looking at images such as thumbnail images, icons and the like laid out and displayed on the image display 206, and selects an image.

[0016]

Further, the images such as thumbnail images and icons are laid out and displayed as indicated by 701 in Fig. 7. The touch-sensitive pointing device 308 is controlled such that the cursor in the display screen on the front surface is moved in the direction of an arrow by moving the finger on the rear surface (702 in Fig. 7) in a direction of an arrow.

[0017]

Reference numeral 207 indicates a protrusion provided on the touch-sensitive pointing device 208 so as to indicate a home position. The function of the home position will be described later.

[0018]

Reference numeral 206 indicates an image display for displaying image information received by an infrared receiving portion 205, image information sent from remote memory by wireless communication, or information stored in built-in memory. The infrared receiving portion 205 serves to receive image information or the like from the outside. The touch-sensitive pointing device 208 is used to select image information or the like displayed on the image display 206, or instruct other operations.

[0019]

Reference numeral 209 indicates a rib which is provided on the circumference of the pointing device 208 and guides the movements of the finger. By further providing the rib 209 on a concentric circle of the pointing device 208, the user can put his/her finger in rotary motion without looking at the rear surface while looking at the image information on the screen.

[0020]

Fig. 3 is a cross-sectional view of an operating member.

[0021]

Reference numerals 301, 302 and 303 respectively indicate the image processor as seen from the front, from the rear, and in a cross-sectional view taken along line A-A'. Since the image processor has already been described in detail with reference to Fig. 2, detailed description thereof will be omitted.

[0022]

Fig. 4 is a view showing the relationship between the screen layout of the image display 2 and the operating member of the touch-sensitive pointing device 7. This drawing shows that the same numerals on the front and rear surfaces correspond to each other.

[0023]

As shown in the drawing, a doughnut-shaped area formed by the concentric circles of the operating device is equally divided into regions. Information on the coordinates of the respective regions is stored in the ROM 6 in advance. Every time it is detected that the finger is on the touch-sensitive pointing device 7, the data on the coordinates of the respective regions is verified, and the cursor is permitted to move in accordance with the operating condition. The cursor is moved based on detection of the home position.

[0024]



A processing for detecting the home position will be described with reference to Figs. 5 and 6.

[0025]

Fig. 6 is a flowchart for operating the detection of the home position.

[0026]

In step S901, as indicated by 501 in Fig. 5, thumbnail images or icons are laid out and displayed on the screen. Subsequently, in step S902, a determination is made as to whether the designation of the home position indicated by 504 in Fig. 5 is detected. Namely, the cursor is displayed at the home position (503 in Fig. 5) until the designation of the home position by the user is detected.

[0027]

When the designation of the home position is not detected in step S902, inputs other than the input of the home position are ignored.

[0028]

When the designation of the home position is detected in step S902, a buzzer is sounded in step S904, indicating that the input has been accepted.

[0029]

Subsequently, in step S905, a determination is made as to whether the user has moved his/her finger from the home position B-01. When there is no finger movement and the finger is released from the home position B-01, an item corresponding to A-01 is executed in step S908.

[0030]

When the finger is moved to B-02 and released therefrom in step S906, an item corresponding to A-02 is executed in step S909. Further, when the finger is moved and not released, a processing in step S907 is carried out. In step S907, when the finger is moved to B-03 and released therefrom as in step S906, an item corresponding to A-03 is executed in step S910. The above processing is repeated for other positions as well.

[0031]

Namely, in the embodiment of the present invention, an input to the touch-sensitive pointing device 7 is enabled based on the designation of the home position. When the finger is released from a position on the touch-sensitive pointing device 7, an item corresponding to the position is executed.

[0032]

Further, in the embodiment of the present invention, as indicated by reference numeral 504 in Fig. 5, a protrusion is provided on the touch-sensitive pointing device 7 at a position defining the home position (i.e., the position B-01). Namely, the designation of the home position can be carried out by groping.

[0033]

When the cursor is on A-01 and the image thereon is displayed, the cursor is not permitted to move unless the user's finger comes into the coordinates in the range of B-01. Moreover, when the cursor is on A-01 and the image thereon is displayed, the cursor is permitted to move only in the direction of B-02. After it is detected that the finger is on the position of B-01, the buzzer is sounded and the cursor is permitted to move. With the finger on the pointing device 7, the cursor is moved every time the corresponding area on the coordinates is changed. After the finger is off the pointing device 7, the function of the icon on which the cursor is located is executed.

[0034]

Fig. 8 is a view showing exemplary screen images on the image display 2.

[0035]

(Other Embodiments)

The technique described in the above embodiment can be applied to the operation of a reproducing function using a display screen of a still camera, a video camera, an electronic portable terminal, a head-mounted display, a car navigation system, and the like.

[0036]

Further, this technique can be applied by combining a VCR, a device for reading information on an image photographed with a digital still camera from a storage medium, or a device for reproducing images stored in an APS cartridge after development thereof, with a remote control including a rotary dial.

[0037]

This technique can also be applied to the search in a list of telephone numbers or fax numbers or in answerphone messages.

[0038]

While the thumbnail image which is square has been described in the above embodiment, the thumbnail image is not limited to being square and may be rectangular in the portrait or landscape orientation in accordance with the direction in which the image is photographed.

[0039]

Further, while the square layout of the thumbnail images is displayed in the above embodiment, the layout may be rectangular or oval.

[0040]

Furthermore, while the touch-sensitive pointing device is circular in the above embodiment, the touch-sensitive pointing device is not limited to the same and may be rectangular, square or oval.

[0041]

[Effects of the Invention]

As described above, according to the present invention, more intuitive feeling of operation can be obtained by matching an image laid out and displayed on a screen with the motion of the user's finger. Further, movement of the cursor, namely, selection of an image can be carried out by simple rotary operation of the finger.

[0042]

Moreover, the operation for selecting an image can be carried out without looking at the operating section while looking at the display screen.

[0043]

Further, erroneous operation can be reduced by inhibiting the operation until the home position is designated.

## [BRIEF DESCRIPTION OF THE DRAWINGS]

[Fig. 1]

Fig. 1 is a block diagram showing the components of an image processor of the present invention.

[Fig. 2]

Fig. 2 is a view showing the structures of a display section and an operating section.

[Fig. 3]

Fig. 3 is a cross-sectional view of an operating member.

[Fig. 4]

Fig. 4 is a view showing the corresponding relationship between the layout of a display screen and the operating section.

[Fig. 5]

Fig. 5 is a view showing the relationship between the layout of the display screen and the home position of the operating section.

[Fig. 6]

Fig. 6 is a flowchart for detecting the home position.

[Fig. 7]

Fig. 7 is a view showing the relationship between the display and the operating section with regard to directions in which objects to be selected are moved.

[Fig. 8]

Fig. 8 is a view showing exemplary screen images.

## DRAWINGS

### FIG. 1

- 2 IMAGE DISPLAY
- 3 PHS MODULE
- 4 IrDA MODULE
- 7 TOUCH-SENSITIVE POINTING DEVICE
- 8 MICROPHONE
- 9 SPEAKER
- 10 HEADPHONE
- 11 BATTERY

### FIG. 2

- (1) TOP SURFACE
- (2) FRONT SURFACE
- (3) RIGHT SIDE SURFACE
- (4) REAR SURFACE
- 205 INFRARED RECEIVING PORTION
- 206 IMAGE DISPLAY
- 207 PROTRUSION AT HOME POSITION
- 208 TOUCH-SENSITIVE POINTING DEVICE

### FIG. 3

- (1) FRONT SURFACE
- (2) REAR SURFACE
- (3) CROSS SECTION TAKEN ALONG LINE A-A'

(4) HOME POSITION

(5) TOUCH-SENSITIVE POINTING DEVICE

FIG. 4

(1) FRONT SURFACE

(2) REAR SURFACE

(3) IMAGE DISPLAY

(4) TOUCH-SENSITIVE POINTING DEVICE

FIG. 5

(1) FRONT SURFACE

(2) REAR SURFACE

503 HOME POSITION

504 PROTRUSION

FIG. 6

S901 DISPLAY LIST

S902 HOME POSITION B-01 DETECTED?

S903 IGNORE

S904 SOUND BUZZER

S905 PERMIT CURSOR MOVEMENT

S906 DETECT B-02

S907 DETECT B-03

S908 EXECUTE ITEM CORRESPONDING TO A-01

S909 EXECUTE ITEM CORRESPONDING TO A-02



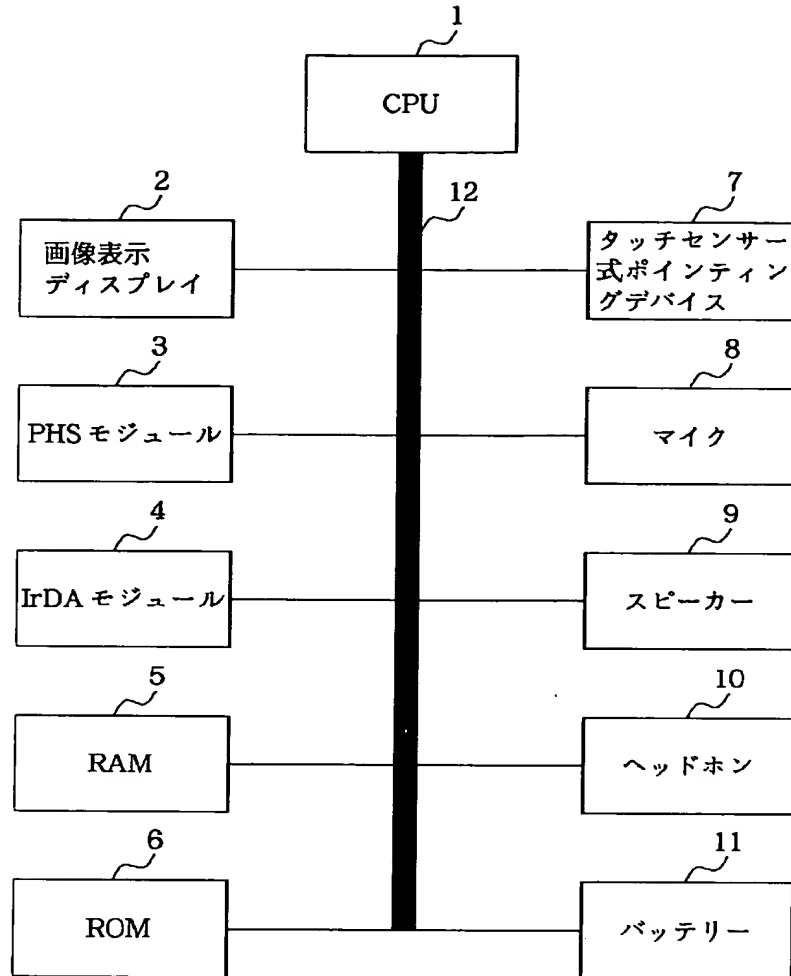
**S910 EXECUTE ITEM CORRESPONDING TO A-03**

**FIG. 7**

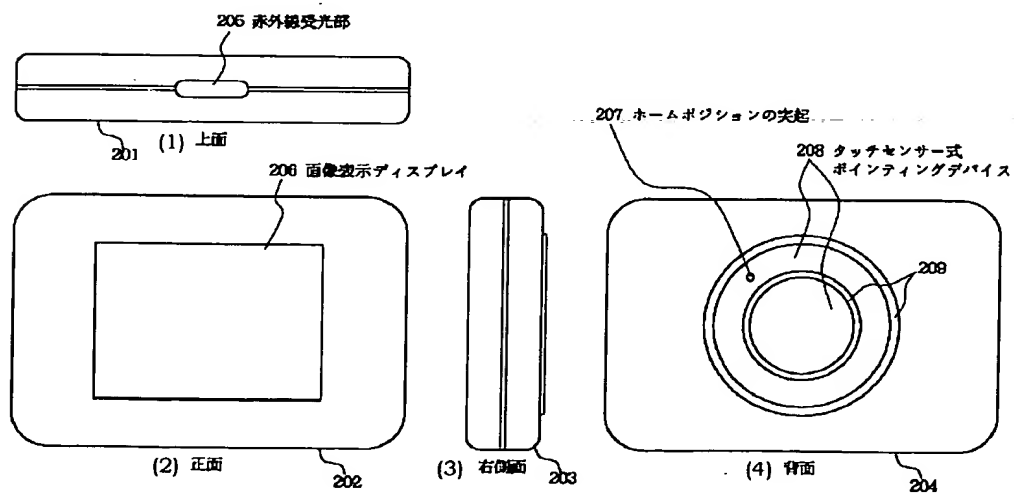
**(1) FRONT SURFACE**

**(2) REAR SURFACE**

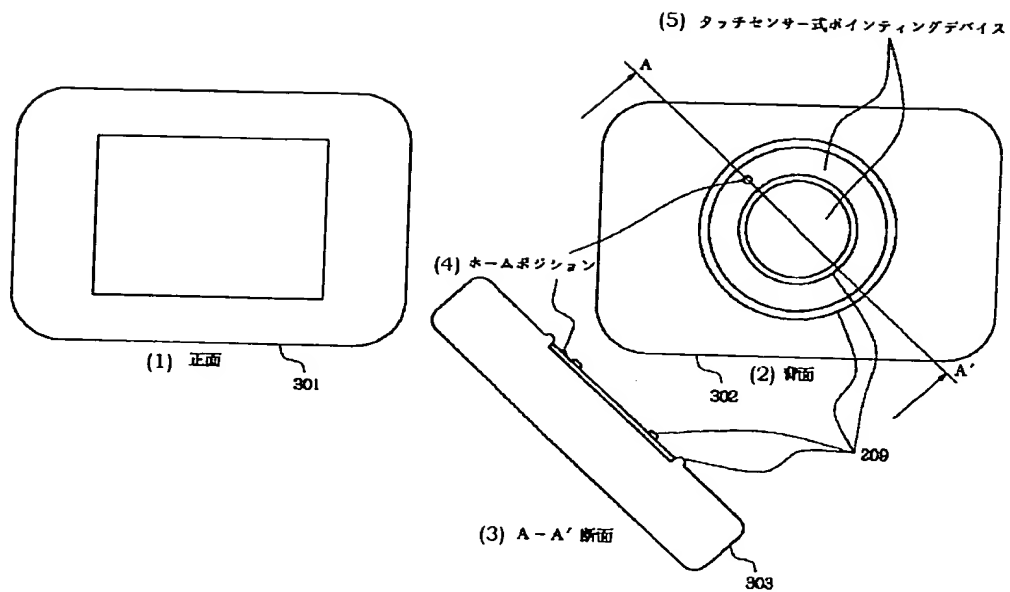
[FIG. 1]



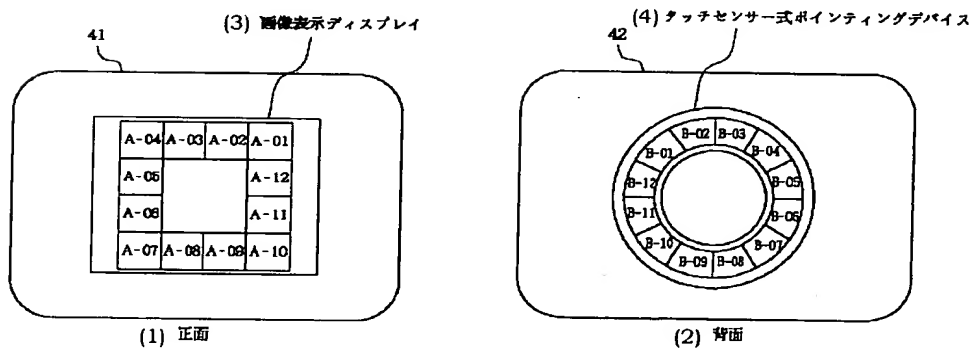
[FIG. 2]



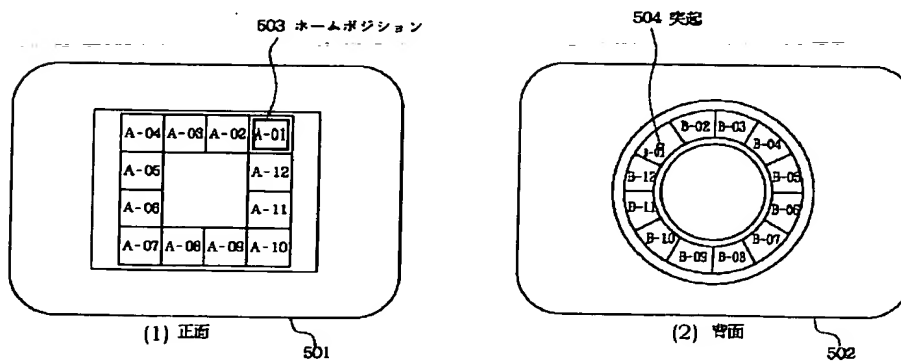
[FIG. 3]



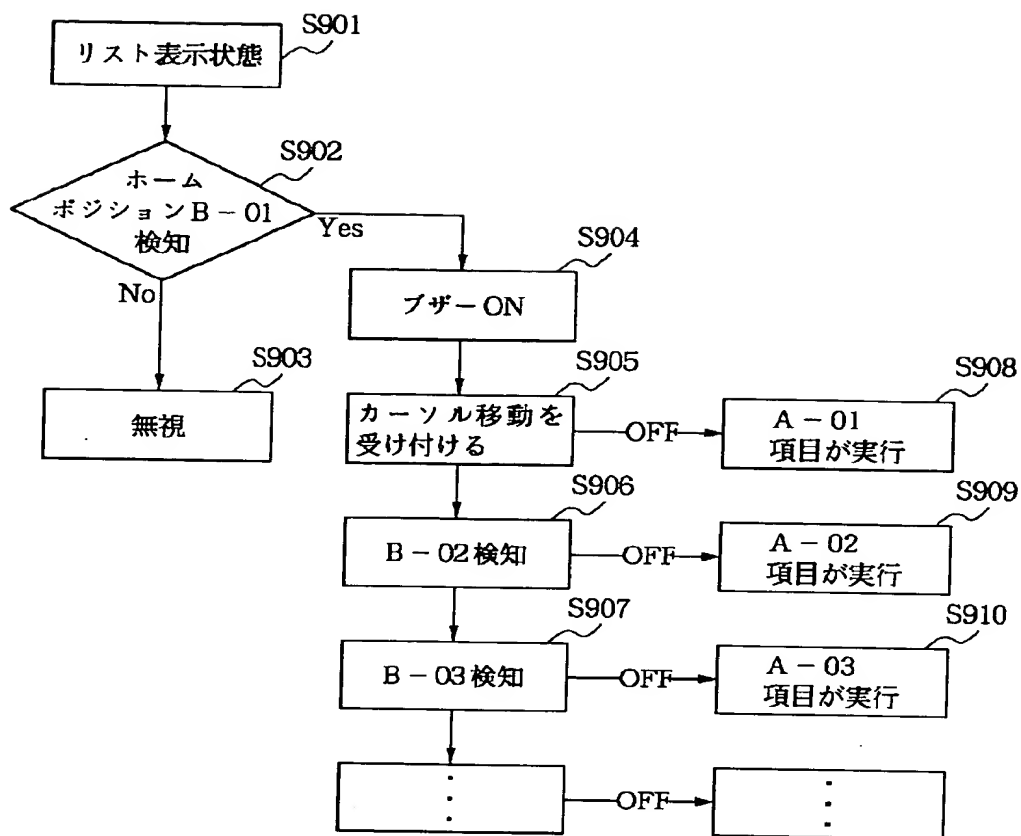
[FIG. 4]



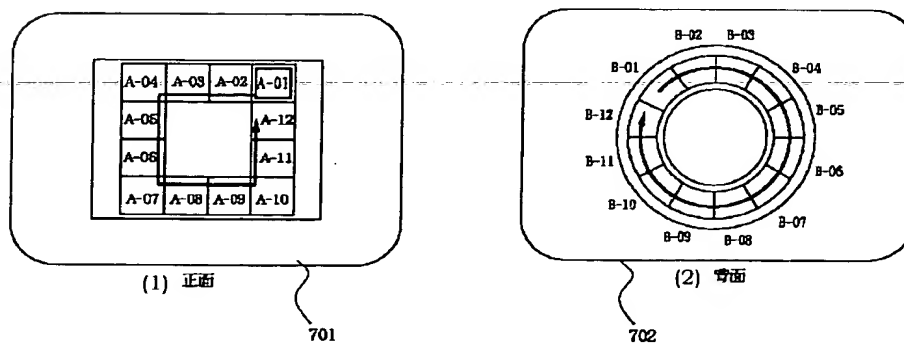
[FIG. 5]



[FIG. 6]



[FIG. 7]



[FIG. 8]

